



## INTRODUCTION

Industrial performance, environmental performance and local acceptability all go together. OCP has been committed for many years to **reducing its atmospheric emissions** in particular. The challenge is not only important for **human health and the flora and fauna**, but also for **the improvement of production costs**, as an outcome of the Circular Economy.

This is developed through:

- **regular changes in the production process**: the case, for example, of the technology for producing sulfuric acid, which has gone from simple absorption, to double absorption, and recently to the

SULFACID system, which in 30 years has made it possible to drastically reduce the level of emissions (from values above 600 ppm to values below 15 ppm).

- **continuous monitoring**, coupled with atmospheric dispersion models, allowing **immediate or preventive corrective measures** and in particular being able to review trade-offs, depending on the level of production.

OCP's goal by 2028 is **to be 100% compliant with the limits set out by the World Bank** (which are the most constraining levels worldwide) **on all of its chimneys**.

## SULFUR DIOXIDE EMISSIONS

➤ **Activities concerned : Production of sulfuric acid**

➤ **Industrial sites concerned : Safi - Jorf Lasfar**

➤ **State:**

- **Safi: 8 operating lines (2 double absorption) and 01 line in project**
- **4/9 compliant with the WB** (<450 mg / Nm<sup>3</sup>), 100% of the lines will comply with the draft Moroccan sectoral limit values by 2025.
- 3 lines are equipped with SULFACID technology which limits sulfur dioxide emissions to less than 15 ppm.
- **100%** of the chimneys have online analyzers.
- The annual sulfur dioxide polluting load of the site decreased from 24 Kt / year to 10.7 Kt / year, i.e. a reduction of **-56%** compared to the 2018 situation, due to the commissioning of SULFACID.
- In 2025, the overall sulfur dioxide polluting load of the 2018 site will be reduced by **-86%**.
- In 2025, the site's sulfur dioxide polluting load will be lower than that corresponding to **100%** compliance of all sulfuric lines with the 157 ppm emission limit value (ELV) recommended by the WB.
- 2 continuous air quality measuring stations are operational on the Site.
- The sulfuric acid units are controlled by operating scenarios depending on weather conditions. These scenarios can vary from rate reduction to line stopping.
- A modeling system for the dispersion of atmospheric emissions in real and forecast times (PLUM'AIR), is **set up and operational**.
- **Jorf Lasfar: 14 lines with double absorption in operation and 02 lines in project**
- **9/16** compliant with the WB (<450 mg / Nm<sup>3</sup>), 100% of the lines compliant with the draft Moroccan sectoral limit values.

- 2 lines are equipped with SULFACID technology which allows sulfur dioxide emissions to be limited to less than 15 ppm, with plans to generalize this technology (or equivalent) on 4 other lines.
- Annual accumulation of the sulfur dioxide polluting load decreased from 32 Kt / year to 26 Kt / year despite the start-up of 4 new units. (This PL will be reduced by **-46%** in 2025).
- **100%** of the chimneys have online analyzers.
- **3** continuous air quality measuring stations are operational on the Site. A fourth one in van format is being acquired.
- Commissioning of the PLUM'AIR solution, which constitutes a **system for modeling the dispersion of atmospheric emissions, in real and forecast times**. This system is equipped with the latest technologies in terms of emission control and air quality (Automatic notifications, reporting, scenario simulation, monitoring of accidental events, etc.)
- The PLUM'AIR solution at the Jorf Lasfar site also allows modeling the dispersion of emissions in the workplace (in 3D)
- Establishment of a network of online sulfur dioxide sensors in the workplace.

### ➤ **Environmental action plan:**

- To be commissioned in end of 2021, a double absorption line (PS4) to replace the shutdown of three single absorption lines at Safi. The contractual value for the new PS4 unit is **450 mg/Nm<sup>3</sup>** (WB compliant).
- Generalization of SULFACID technology (or equivalent) on **4 other SAP lines at Jorf Lasfar** (SO<sub>2</sub> <15 ppm), by 2025.
- Generalization of 100% compliance with WB thresholds for the rest of the lines (2 double absorption lines at Safi and 3 JVs at Jorf Lasfar)
- Exploration of new techniques to reduce sulfur oxides emissions (**Trials in progress**)



### ➤ Focus on SULFACID technology:

Process incubated and designed at OCP group in partnership with a world leader in gas treatment. More than 50M \$ committed for the equipment of 5 sulfuric acid production lines.



- Ammonia is concerned by the PLUM'AIR system mentioned above.
- The site's industrial development program provides for **3 additional lines**. This project has already received environmental acceptability from the National Committee for Environmental and Social Impact Studies (CNEI).
- The contractual value for the new fertilizer production units of the industrial development program is **30 mg/Nm<sup>3</sup>** (in accordance with the WB).

### FLUORIDE GASES EMISSIONS

➤ **Activities concerned:** Phosphoric acid production and fertilizer production

➤ **Industrial sites concerned:** Safi - Jorf Lasfar

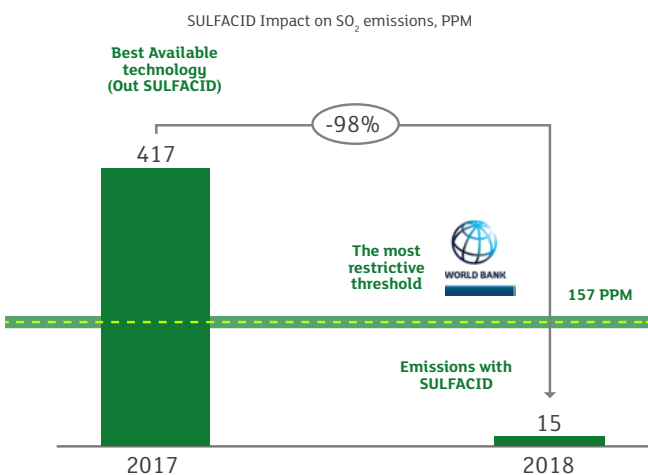
➤ **State:**

- **100%** of phosphoric acid and fertilizer production units at the two sites comply with the WB (<5mg / Nm<sup>3</sup>) and the Moroccan sectoral limit values project.
- **100%** of the chimneys have online analyzing monitoring.
- The fluoride concentration in air quality is controlled by modeling atmospheric emissions (PLUM'AIR) and the movements of mobile air quality stations.
- Air quality measurement stations as well as ad hoc campaigns by third parties give very low values in terms of fluoride gases.
- At Safi, the annual cumulative of fluoride gases pollutant load fell from around 1 Kt / year to less than 0.07 Kt/year (i.e. a reduction of -93%) due to the fluoride gas washing project carried out in 2019.
- At Jorf Lasfar, the annual cumulative fluoride gases polluting load decreased from 0.24 Kt/year approximately to less than 0.13 Kt/year (i.e. a reduction of **-46%**) and this is due to the project of phosphoric lines adaptation to the slurry pipeline.

➤ **Environmental action plan :**

- Investigations and tests to eliminate the odor associated with low levels of fluoride gases
- Investigations and tests for the recovery and recycling of fluorine (FSA, CaF<sub>2</sub>, etc.)

### A radical impact on sulfur dioxide emissions



### EMISSIONS OF AMMONIA

➤ **Activities concerned:** Production of nitrogenous fertilizers (MAP, DAP, NPK, etc.)

➤ **Industrial sites concerned:** Jorf Lasfar

➤ **State :**

- The content at the outlet of all chimneys at the Jorf Lasfar Site is less than 45 mg/Nm<sup>3</sup> (**100%** of the chimneys comply with the WB and Moroccan regulations).
- **100%** of the chimneys have online analysing monitoring.
- Establishment of a network of online ammonia sensors in the workplace.



## HYDROGEN SULFIDE EMISSIONS

➤ **Activities concerned:** Melting sulfur and phosphoric acid pretreatment

➤ **Industrial sites concerned:** Safi – Jorf Lasfar

➤ **State:**

- The new sulfur melting U263 at Jorf Lasfar has a hydrogen sulfide washing unit using sodium hydroxide to meet the ELV of the WB and the draft of Moroccan sectoral limits.
- This washing unit is equipped with an online hydrogen sulfide analyzer at the outlet of the chimney.
- The phosphoric acid pretreatment units at the two sites also have a hydrogen sulfide gas washing system enabling it to comply with the national ELV and the WB.
- The old sulfur melting units emissions at the two sites do not comply with the WB or the Moroccan standard. Upgrading projects are underway.
- Hydrogen sulfide is also concerned by the PLUM’AIR system mentioned above.
- In terms of ambient air quality, this parameter is controlled by mobile stations and the PLUM’AIR atmospheric emissions modeling system.

➤ **Environmental action plan:**

- The hydrogen sulfide gas scrubbing units construction project is underway at both sites: **Completion is expected by 2021.**
- Installation and commissioning online hydrogen sulfide analyzing monitoring at the exit chimney, is built into the requirements of these projects.

## DUST EMISSIONS (MP)

➤ **Activities concerned:** Phosphate drying and calcination units, dry phosphate grinding units, fertilizer production units, MCP / DCP units.

➤ **Industrial sites concerned:** All sites.

➤ **State:**

- The development slurry pipeline service between the site of Khouribga and Jorf Lasfar since 2014 has enabled it to **abandon the dry grinding of phosphate and to achieve Zero phosphate dust emissions.**
- With the exception of the phosphate grinding units at Safi, **100% of the other chimneys are equipped with online dust analyzers.**
- In terms of ambient air quality, this parameter is controlled by mobile stations, by the air emissions modeling system PLUM’AIR and by air quality control campaigns by third parties.

	Phosphate drying units	Phosphate calcination units	Phosphate dry grinding units	Fertilizer / MCP / DCP production lines	Lines in project
Number of chimneys	21	2	9	23	3
Design issue threshold	15 CH < 100mg/Nm <sup>3</sup> 6 CH > 100mg/nm <sup>3</sup>	350 mg/nm <sup>3</sup>	100 mg/nm <sup>3</sup>	50 mg/nm <sup>3</sup>	50 mg/nm <sup>3</sup>
Improvements underway	For the 6 CH > 100mg/Nm <sup>3</sup> : 3: stopped in 2019 3: will be stopped by 2022	--	Will be provided with efficient bag filters to lower the 10 mg/Nm <sup>3</sup> threshold	--	--